

## NSTAR Electric & Gas Corporation Urban Grid Monitoring and Renewables Integration

### Project Description

NSTAR will enhance grid monitoring instrumentation on one of its secondary area network grids in downtown Boston, MA using state-of-the-art sensor equipment to monitor current and conductor temperature. This project will monitor grid-points in about 445 manholes with a layered instrumentation approach. The manholes designated "minor nodes" (about 315) will have sensors that detect high and low current and cable temperature threshold values on individual secondary-main cables within the grid-point. These nodes will have wireless transmitters to broadcast the alarms which will be collected wirelessly. The "major nodes" manholes (about 130) will be instrumented with technology to provide current sensing on a real time basis and be equipped with powerline carrier technology to allow near real-time monitoring at the operations center. Advanced metering infrastructure-capable meters will be deployed at customer locations on the grid where solar photovoltaics (PV) are located and will monitor consumption. In two substations, the remote terminal units will be upgraded to include programmable logic controllers (PLCs) to store network feeder information, continuously analyze data, and take actions when necessary. Information from the sensors, smart meters, and SCADA data will be sent to a repository for analysis.

### Goals/Objectives

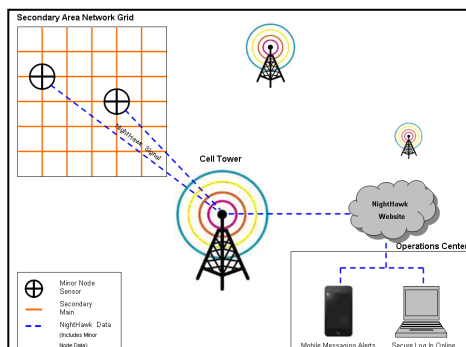
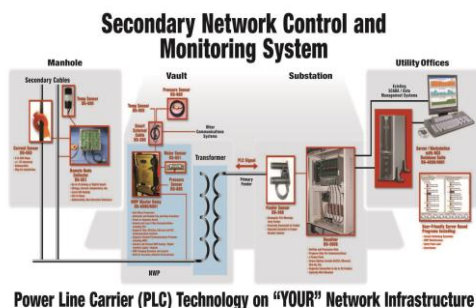
- Demonstrate a new technique for integrating inverter-based distributed generation (DG) (e.g., solar PV) with a secondary area network grid
- Demonstrate the viability of the project's "minor node" monitoring approach
- Demonstrate Proposed IEEE1547.6 standard's viability for inverter based DG

### Key Milestones

- Minor Node Sensor Manufacturing (August 2012)
- Commissioning and Operation of Urban Grid Monitoring (December 2013)
- Major & Minor Node Sensor Installation Completed (December 2013)
- Completion of Operational Data Collection (December 2015)

### Benefits

- Greatly improved knowledge of the urban grid's status in near real-time allowing proactive maintenance leading to improved safety & reliability
- Possibly enable DG integration with secondary area network grids



### CONTACTS

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### PARTNERS

Digital Grid, Inc  
SoftStuf, Inc.  
Nighthawk, Inc

### PROJECT DURATION

02/01/2010–12/31/2015

### BUDGET

Total Project Value  
\$10,591,934

DOE/Non-DOE Share  
\$5,267,592/\$5,324,342

### EQUIPMENT

Major & Minor Node Sensors  
Enhanced Substation SCADA  
Programmable Logic Controllers

### DEMONSTRATION STATES

Massachusetts

CID: OE0000293

Managed by the National Energy  
Technology Laboratory for the Office of  
Electricity Delivery and Energy Reliability